

UK Patent Application (12) GB (19) (11) 2 336 371 (13) A

(43) Date of A Publication 20.10.1999

(21) Application No 9807664.9

(22) Date of Filing 14.04.1998

(71) Applicant(s)

Reckitt & Colman Inc
(Incorporated in USA - Delaware)
1655 Valley Road, Wayne, New Jersey 07474,
United States of America

(72) Inventor(s)

Robert Zhong Lu
Ralph Edward Rypkema
Andrew Arno Kloeppel
Dennis Thomas Smialowicz
Nick Nanavati
Mike Love
Robert William Bogart
Frederic Albert Taraschi
Karen Ann McCue
Diane Joyce Burt

(51) INT CL⁶
C11D 3/00

(52) UK CL (Edition Q)
CSD DHX D120 D121 D123 D124 D162 D165 D166 D182

(56) Documents Cited
GB 2309706 A WO 95/31962 A1 US 4755327 A

(58) Field of Search
UK CL (Edition Q) CSD DHX DHZ DJX D162
INT CL⁶ C11D 3/00
Online: WPI, CLAIMS

(74) Agent and/or Address for Service

Martin N Dale
Reckitt & Colman Plc, Group Patents Department,
Dansom Lane, HULL, HU8 7DS, United Kingdom

(54) Abstract Title

Aqueous disinfecting and cleaning composition

(57) Aqueous disinfecting and cleaning compositions and concentrates which are efficacious against gram positive and gram negative bacteria, have relatively low volatile organic content ("VOC") and are surprisingly mild to the user of the compositions. The compositions include a quaternary ammonium compound as its primary germicidal active agent, have a low content of active constituents, and do not include organic solvents such as alcohols, glycols, or glycol ethers in significant amounts.

GB 2 336 371 A

IMPROVEMENTS IN OR RELATING TO ORGANIC COMPOSITIONS

5

The present invention relates to improvements in cleaning compositions.

More particularly the present invention is directed to improved cleaning compositions which find particular use in hard surface cleaning and disinfecting applications.

Certain hard surface formulations are known. For example, in US 3539520 to 10 Cantor et al. are illustrated certain 'detergent-sanitizer' compositions. There are essentially based on aqueous mixtures of quaternary ammonium compounds as germicidal active agents in conjunction with nonionic surfactants based on alkoxy block copolymers, and in particular, compounds based on ethoxy/propoxy block copolymers. Therein Cantor notes that such nonionic surfactants surprisingly do not 15 interfere with the germicidal effect of the quaternary ammonium compounds, and copious examples illustrate the utility of these specific nonionic surfactants as opposed to other classes of nonionic surfactants. Cantor notes, but however does not illustrate, any significant cleaning testing or results in his compositions, and in fact teaches away from the use of these particular nonionic surfactant compounds based on 20 ethoxy/propoxy block copolymers in conjunction with other classes of nonionic surfactants. Cantor is also wholly silent as to the dermal and ocular irritation characteristics of his compositions.

More recently, in US 5454984 to Graubart et al. are recited all-purpose 25 aqueous cleaning compositions which also include quaternary ammonium compounds as germicidal active agents, in conjunction with non-ionic surfactants which are desirably a ternary non-ionic surfactant system which includes three different nonionic surfactants. None of these nonionic surfactants of the ternary system are 30 based on ethoxy/propoxy block copolymers. Further, the recited aqueous all-purpose aqueous cleaning compositions include an appreciable amount of an organic solvent constituent, believed to significantly facilitate the soil loosening and overall cleaning effects of these cleaning compositions.

Certain patents have recognized the fact that aqueous compositions containing quaternary ammonium compounds which provide a sanitizing benefit advantageously include one or more chemical compounds which function to mitigate such compositions, particularly with respect to the potential for ocular irritation. For example, in US Patent 4336151 to Like et al. therein are disclosed certain materials which are useful as irritation mitigants including certain ethoxylated cocodiethanolamides, certain polyoxyethylenes, certain hydrolyzed animal proteins, allantoin, 1,6-hexylene glycol, stearyl dimethylamine oxide, certain dextrose sugars and imidazole. US Patent 5547990 to Hall et al. discusses further irritation mitigants based on certain substituted imidazoline amphoteric surfactants as being useful in conjunction with didecyl dimethyl ammonium chloride, although this effect was not found with other types of quaternary ammonium compounds.

The contents of the US Patent documents indicated above are incorporated herein by reference.

Notwithstanding advantageous known art formulations, there yet remains a real and continuing need in the art for improved cleaning and disinfecting compositions in general, and in specific such compositions which provide at least one, but feature a plurality of the following characteristics: low volatile organic content, low irritancy to the end user of the composition, phase stability in storage (both at freeze-thaw, room temperature (i.e., 20°C) and elevated temperature (i.e., 40°C) conditions), ease of fabrication, low cost, efficacy against gram positive bacteria, efficacy against gram negative bacteria, good cleaning characteristics, and relatively low percentages actives required in such an aqueous formulation.

The compositions of the invention are aqueous disinfecting and cleaning compositions and concentrates thereof which are effective cleaning compositions and are efficacious as disinfecting compositions against gram positive and gram negative bacteria, have relatively low volatile organic content ("VOC") and are mild to the user of the compositions. That these results are concurrently achieved with a composition which includes a quaternary ammonium compound as its primary germicidal active agent is surprising, and indicates a synergistic effect not apparent from the prior art.

These compositions also provide good cleaning and disinfecting properties with low amounts of active constituents, and according to certain preferred embodiments do not include organic solvents such as low molecular weight alcohols, glycols or glycol ethers, in significant amounts, i.e., amounts in excess of about 1%wt and more.

5 In accordance with a first aspect of the invention there is provided an aqueous disinfecting and cleaning composition in a concentrated form which exhibits reduced irritancy which comprises (preferably consists essentially of):

a disinfecting effective amount of a quaternary ammonium compound having germicidal properties, desirably present in an amount of from about 0.001 -

10 5% wt.;

a mitigating effective amount of at least one nonionic surfactant selected from alkylpolyglycoside compounds;

0.1 - 10%wt. of at least one further nonionic surfactant, preferably selected from alkoxylated primary alcohols;

15 0 - 3%wt. of a polymeric cationic surfactant based on a polyquaternary ammonium salt;

0 - 3%wt. of a builder, desirably present in an amount of about 0.1 - 0.5%wt.;

20 0 - 5%wt. of one or more conventional additives particularly coloring agents, fragrances and fragrance solubilizers, viscosity modifying agents such as thickeners, pH adjusting agents and pH buffers including organic and inorganic salts; and,

water to form 100%wt. of the concentrate form of the inventive compositions.

In accordance with a second aspect of the invention there is provided an 25 aqueous disinfecting and cleaning composition in a concentrated form which exhibits reduced irritancy which comprises (preferably consists essentially of):

a disinfecting effective amount of a quaternary ammonium compound having germicidal properties, desirably present in an amount of from about 0.001 - 5% wt.;

30 a mitigating effective amount of a binary surfactant system which comprises both (a) at least one nonionic surfactant selected from alkylpolyglycoside

compounds, with (b) at least one further nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer, desirably present in an amount of from 0.1 - 10%wt.

0.1 - 10%wt. of at least one further nonionic surfactant, preferably selected from alkoxylated primary alcohols;

5 0 - 3%wt. of a polymeric cationic surfactant based on a polyquaternary ammonium salt;

0 - 3%wt. of a builder, desirably present in an amount of about 0.1 - 0.5%wt.;

10 0 - 5%wt. of one or more conventional additives particularly coloring agents, fragrances and fragrance solubilizers, viscosity modifying agents such as thickeners, pH adjusting agents and pH buffers including organic and inorganic salts; and,

water to form 100%wt. of the concentrate form of the inventive compositions.

In accordance with further preferred embodiments of the invention there are provided aqueous dilutions of the concentrated disinfecting and cleaning composition described above, which provides effective cleaning and sanitization.

15 In certain particularly preferred embodiments, the non-aqueous content of the compositions is particularly low, generally less comprising less than 10%wt., based on the total weight of the composition. Surprisingly however, the compositions provide both effective sanitization and good cleaning.

20 In a further aspect of the invention there is provided a process for cleaning and/or disinfecting surfaces in need of such treatment which includes contacting a surface with a concentrate composition or aqueous dilution of a concentrate composition as taught herein.

25 In a still further aspect of the invention there is provided an aqueous hard surface cleaning and sanitizing composition characterized in exhibiting a reduced potential for ocular irritancy which composition contains a quaternary ammonium compound having germicidal properties, said composition further comprising a irritation mitigating effective amount of a nonionic surfactant based on an

30 alkylpolyglycoside.

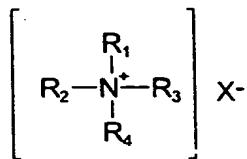
In a still further aspect of the invention there is provided an aqueous hard surface cleaning and sanitizing composition characterized in exhibiting a reduced potential for ocular irritancy which composition contains a quaternary ammonium compound having germicidal properties, said composition further comprising a mitigation 5 mitigating effective amount of a nonionic surfactant based on an alkylpolyglycoside in combination with a mitigating effective amount of a nonionic surfactant based on a nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer.

According to a still further aspect of the invention there is provided a process 10 for mitigating potential ocular irritation caused by an aqueous hard surface cleaning and sanitizing composition which contains a quaternary ammonium compound having germicidal properties, which process includes the step of providing a mitigating effective amount of a nonionic surfactant based on an alkylpolyglycoside to the composition.

According to a yet further aspect of the invention there is provided a process 15 for mitigating potential ocular irritation caused by an aqueous hard surface cleaning and sanitizing composition which process includes the step of providing a mitigating effective amount of a nonionic surfactant based on an alkylpolyglycoside to an aqueous composition which contains a quaternary ammonium compound having 20 germicidal properties and at least one nonionic surfactant compound.

In particularly preferred embodiments the concentrated disinfecting and cleaning compositions provided herein provide good cleaning, effective sanitization of surfaces particularly hard surfaces, and low irritancy to the consumer, especially low ocular irritation.

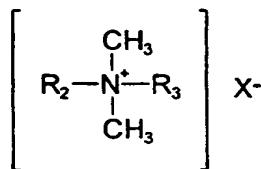
The compositions of the invention include a disinfecting effective amount of a 25 quaternary ammonium compound having germicidal properties. Particularly useful quaternary ammonium compounds and salts thereof include quaternary ammonium germicides which may be characterized by the general structural formula:



where at least one of R_1 , R_2 , R_3 and R_4 is a hydrophobic, aliphatic, aryl aliphatic or aliphatic aryl radical of from 6 to 26 carbon atoms, and the entire cation portion of the molecule has a molecular weight of at least 165. The hydrophobic radicals may be 5 long-chain alkyl, long-chain alkoxy aryl, long-chain alkyl aryl, halogen-substituted long-chain alkyl aryl, long-chain alkyl phenoxy alkyl, aryl alkyl, etc. The remaining radicals on the nitrogen atoms other than the hydrophobic radicals are substituents of a hydrocarbon structure usually containing a total of no more than 12 carbon atoms. The radicals R_1 , R_2 , R_3 and R_4 may be straight chained or may be branched, but are 10 preferably straight chained, and may include one or more amide or ester linkages. The radical X may be any salt-forming anionic radical.

Exemplary quaternary ammonium salts within the above description include the alkyl ammonium halides such as cetyl trimethyl ammonium bromide, alkyl aryl ammonium halides such as octadecyl dimethyl benzyl ammonium bromide, N-alkyl 15 pyridinium halides such as N-cetyl pyridinium bromide, and the like. Other suitable types of quaternary ammonium salts include those in which the molecule contains either amide or ester linkages such as octyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride, N-(laurylcocoaminoformylmethyl)-pyridinium chloride, and the like. Other very effective types of quaternary ammonium compounds which are 20 useful as germicides include those in which the hydrophobic radical is characterized by a substituted aromatic nucleus as in the case of lauryloxyphenyltrimethyl ammonium chloride, cetylaminophenyltrimethyl ammonium methosulfate, dodecylphenyltrimethyl ammonium methosulfate, dodecylbenzyltrimethyl ammonium chloride, chlorinated dodecylbenzyltrimethyl ammonium chloride, and the like.

Preferred quaternary ammonium compounds which act as germicides and 25 which are found useful in the practice of the present invention include those which have the structural formula:



wherein R₂ and R₃ are the same or different C₈-C₁₂alkyl, or R₂ is C₁₂₋₁₆alkyl, C₈₋₁₈alkylethoxy, C₈₋₁₈alkylphenolethoxy and R₃ is benzyl, and X is a halide, for example 5 chloride, bromide or iodide, or X may be methosulfate. The alkyl groups recited in R₂ and R₃ may be straight chained or branched, but are preferably substantially linear.

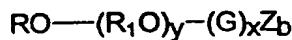
Particularly useful quaternary germicides include compositions which include a single quaternary, as well as mixtures of two or more different quaternaries.

Particularly useful quaternary germicides include BARDAC® 205M, and BARDAC® 10 208M or BTC® 885 which is described to be a blend of alkyl dimethyl benzyl ammonium chlorides; BARDAC® 2050 and BARDAC® 2080 or BTC® 818 which is described to be based on dialkyl(C₈-C₁₀)dimethyl ammonium chloride; BARDAC® 2250 and BARDAC® 2280 or BTC® 1010 which is described to a composition which includes didecyl dimethyl ammonium chloride; BARDAC® LF and 15 BARDAC® LF 80 which is described to be based on dioctyl dimethyl ammonium chloride; BARQUAT® MB-50, HYAMINE® 3500, BARQUAT® MB-80, BTC® 835 or BTC 8358 each described to be based on alkyl dimethyl benzyl ammonium chloride; BARQUAT® MX-50, BARQUAT® MX-80, BTC® 824 or BTC® 8248 each described to be a composition based on alkyl dimethyl benzyl ammonium 20 chloride; BARQUAT® OJ-50, BARQUAT® OJ-80, BTC® 2565, or BTC® 2658 each described to be a composition based on alkyl dimethyl benzyl ammonium chloride; BARQUAT® 4250, BARQUAT® 4280, BARQUAT® 4250Z, BARQUAT® 4280Z, BTC® 2125, or BTC® 2125M each described to be a 25 composition based on alkyl dimethyl benzyl ammonium chloride and/or alkyl dimethyl ethyl benzyl ammonium chloride; BARQUAT® MS-100 or BTC® 324-P-100 each described to be based on myristyl dimethyl benzyl ammonium chloride; HYAMINE® 2389 described to be based on methyl dodecyl benzyl ammonium chloride and/or methyl dodecyl xylene-bis-trimethyl ammonium chloride;

HYAMINE® 1622 described to be an aqueous solution of benzethonium chloride; HYAMINE® 3500-NF or BTC® 50 each described to be based on alkyl dimethyl benzyl ammonium chloride; as well as BARQUAT® 1552 or BTC® 776 described to be based on alkyl dimethyl benzyl ammonium chloride and/or dialkyl methyl benzyl ammonium chloride. (Each of these recited materials are presently commercially available from Lonza, Inc., Fairlawn, NJ and/or from Stepan Co., Northfield IL). It is to be understood that these quaternary ammonium compounds may be used singly or in mixtures of two or more. These quaternary ammonium compounds are desirably present in the concentrate compositions in an amount of from about 0.001 - 5% wt., are desirably present in an amount of from 0.1 - 3%wt. and most desirably are present in an amount of from 0.5 - 3%wt. When diluted in a larger volume of water to form a cleaning and disinfecting composition, the quaternary ammonium compounds should be present in sufficient amount such that they are in a concentration of at least about 150 parts per million (p.p.m.), more desirably at least about 175 p.p.m. and most desirably about 200 - 250 p.p.m. The present inventors have surprisingly found that certain of their formulations exhibited effective cleaning and disinfecting with less than 200 p.p.m. of the quaternary ammonium compounds in cleaning compositions which is an amount below which is generally believed to be necessary for disinfecting efficacy.

The compositions of the invention also include a mitigating effective amount of at least one nonionic surfactant based on an alkylpolyglycoside compound. Exemplary suitable compounds include alkyl monoglycosides and polyglycosides are prepared generally by reacting a monosaccharide, or a compound hydrolyzable to a monosaccharide with an alcohol such as a fatty alcohol in an acid medium. Various glycoside and polyglycoside compounds including alkoxylated glycosides and processes for making them are disclosed in U.S. Patent No. 2,974,134; U.S. Patent No. 3,219,656; U.S. Patent No. 3,598,865; U.S. Patent No. 3,640,998; U.S. Patent No. 3,707,535; U.S. Patent No. 3,772,269; U.S. Patent No. 3,839,318; U.S. Patent No. 3,974,138; U.S. Patent No. 4,223,129; and U.S. Patent No. 4,528,106.

Exemplary alkyl glycoside surfactants suitable for use in the practice of this invention may be represented by formula I below:



wherein:

5 R is a monovalent organic radical containing from about 6 to about 30, preferably from about 8 to about 18 carbon atoms;

R₁ is a divalent hydrocarbon radical containing from about 2 to about 4 carbon atoms, especially ethyl and propyl radicals;

O is an oxygen atom;

10 y is a number which has an average value from about 0 to about 1 and is preferably 0;

G is a moiety derived from a reducing saccharide containing 5 or 6 carbon atoms; and

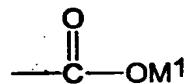
15 x is a number having an average value from about 1 to 5 (preferably from 1.1 to 2);

Z is selected O₂M¹,



20 O(CH₂), CO₂M¹, OSO₃M¹, or O(CH₂)SO₃M¹; R₂ is (CH₂)CO₂M¹ or CH=CHCO₂M¹; with the proviso that Z can be O₂M¹ only if Z is in place of a primary hydroxyl group in which the primary hydroxyl-bearing carbon atom,

—CH₂OH, is oxidized to form a



group);

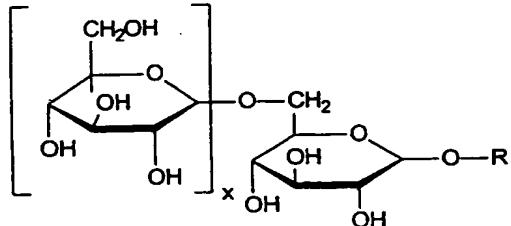
25 b is a number of from 0 to 3x+1 preferably an average of from 0.5 to 2 per glycosal group;

p is 1 to 10,

M^1 is H^+ or an organic or inorganic cation, such as, for example, an alkali metal, ammonium, monoethanolamine, or calcium.

As defined in Formula I above, R is generally the residue of a fatty alcohol having from about 8 to 30 and preferably 8 to 18 carbon atoms.

5 Most preferably, the inventive compositions include an alkylpolyglycoside compound according to the structure:



wherein:

10 R is an alkyl group, preferably a linear alkyl chain, which comprises C8 to C16 alkyl groups;

x is an integer value of from 0 – 3, inclusive.

15 Examples of such alkylpolyglycoside compounds according to this structure include: where R is comprised substantially of C8 and C10 alkyl chains yielding an average value of about 9.1 alkyl groups per molecule (Glucopon® 220 UP, Glucopon® 225 DK); where R is comprised of C8, C10, C12, C14 and C16 alkyl chains yielding an average value of about 10.3 alkyl groups per molecule (Glucopon® 425); where R is comprised substantially of C12, C14 and C16 alkyl chains yielding an average value of about 12.8 alkyl groups per molecule (Glucopon® 600 UP, Glucopon® 625 CSUP, and Glucopon® 625 FE, all of which are available from Henkel Corp., Ambler PA.)

20 Also useful as the alkylpolyglycoside compound is Triton® CG-110 (Union Carbide Corp.).

25 Further examples of commercially available alkylglycosides as described above include, for example, Glucopon® 325N which is described as being a 50% C₉-C₁₁ alkyl polyglycoside, also commonly referred to as D-glucopyranoside (from Henkel Corp, Ambler PA). Particularly preferred as the alkylpolyglycoside compounds are those illustrated in the Examples.

The inclusion of the alkylpolyglycoside compound to the compositions significantly reduce the irritation potential of the aqueous compositions as compared to like compositions which however omit this constituent. In corresponding copending US Serial No 08/984670 compositions which included only the nonionic surfactant constituent based on a polymeric alkylene oxide block copolymer were found to have generally satisfactory low ocular irritation potential. Therein, alkylpolyglycosides are indicated as one of a number of optional nonionic surfactants which might also be present, but that application does not indicate that any of these nonionic surfactants might be useful in providing an irritation mitigating effect. Only presently have the present inventors discovered that compositions, especially those according to 5 particularly preferred embodiments of the present invention, which further include the alkylpolyglycoside compound as a necessary constituent have even further reduced ocular irritation potential. While not wishing to be bound by the following, it is theorized that the presence of both a nonionic surfactant constituent based on a compound other than an alkylpolyglycoside in conjunction with the nonionic 10 surfactant based on the alkylpolyglycoside compound have a synergistic or complementary effect in reducing the irritation potential of such aqueous compositions. When both are present, as in the first embodiment of the invention, the former to the latter are desirably included in relative weight ratios of from 3:1 to 15 1.5:1. This irritation mitigating effect has also been found in the inventive compositions according to the second aspect of the invention, wherein there is present the binary surfactant system which comprises at least one nonionic surfactant selected from alkylpolyglycoside compounds, and at least one further nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer. 20 According to this second embodiment of the invention, generally good results have been observed when the weight ratio of the alkylpolyglycoside compounds to the polymeric alkylene oxide block copolymer are in respective ratios of from 0.5:1 – 2:1. 25 The amounts of the nonionic surfactant based on an alkylpolyglycoside compound to the compositions may vary in accordance with the level of irritancy 30 mitigation sought. Generally, the alkylpolyglycoside surfactant may be included in

any amount which mitigates irritancy. Good efficacy is found when present from about 0.01 – 10%wt. based on the total weight of the composition, but amounts of from 0.1 – 7%wt. and preferably from about 0.5 – 4%wt. are preferred. It is to be understood that the amount which is to be included will vary upon several factors such as the amounts of the other constituents present in a composition, as well as the irritancy levels of such other constituents. The optimal amount of the alkylpolyglycoside surfactant to be included may be determined by routine experimentation, such as by the method outlined with reference to the Examples.

In compositions according to the second aspect of the invention, the amounts of the two surfactants which comprise the binary surfactant system, may vary in accordance with the level of irritancy mitigation sought. Generally, the at least one nonionic surfactant selected from alkylpolyglycoside compounds is present from about 0.01 – 9.99%wt., but is preferably present from 0.01 – 4%wt., and at the same time the nonionic surfactant compound based on the polymeric alkylene oxide block copolymer may also be present in amounts of from 0.01 – 9.99%wt, but preferably are present in an amount of from 0.5 – 2%wt. The optimal amount of the two surfactants which make up the binary surfactant system which are to be included in the inventive compositions may be determined by routine experimentation, such as by the method outlined with reference to the Examples. While not wishing to be bound by the following, it is believed that the presence of the alkylpolyglycoside compounds with the polymeric alkylene oxide block copolymer compounds provide a synergistic improvement with respect to the mitigation of the level of irritancy, particularly the ocular irritancy of the inventive compositions.

By way of non-limiting example, useful nonionic surfactants based on polymeric alkylene oxide block copolymers which are included in the second aspect of the invention, include nonionic surfactants in which the major portion of the molecule is made up of block polymeric C₂-C₄ alkylene oxides. Such nonionic surfactants, while preferably built up from an alkylene oxide chain starting group, and can have as a starting nucleus almost any active hydrogen containing group including, without limitation, amides, phenols, thiols and secondary alcohols.

One group of such useful nonionic surfactants containing the characteristic alkylene oxide blocks are those which may be generally represented by the formula (A):



5 where EO represents ethylene oxide,
PO represents propylene oxide,
y equals at least 15,
(EO)_{x+z} equals 20 to 50% of the total weight of said compounds, and,
the total molecular weight is preferably in the range of about 2000 to 15,000.

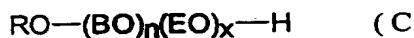
10 Another group of nonionic surfactants appropriate for use in the new compositions can be represented by the formula (B):



15 wherein R is an alkyl, aryl or aralkyl group, where the R group contains 1 to 20 carbon atoms, the weight percent of EO is within the range of 0 to 45% in one of the blocks a, b, and within the range of 60 to 100% in the other of the blocks a, b, and the total number of moles of combined EO and PO is in the range of 6 to 125 moles, with 1 to 50 moles in the PO rich block and 5 to 100 moles in the EO rich block.

20 Further nonionic surfactants which in general are encompassed by Formula B include butoxy derivatives of propylene oxide/ethylene oxide block polymers having molecular weights within the range of about 2000-5000.

Still further useful nonionic surfactants containing polymeric butoxy (BO) groups can be represented by formula (C) as follows:



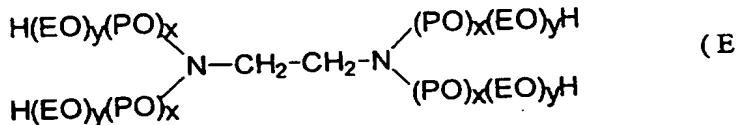
25 wherein R is an alkyl group containing 1 to 20 carbon atoms,
n is about 5-15 and x is about 5-15.

Also useful as the nonionic block copolymer surfactants, which also include polymeric butoxy groups, are those which may be represented by the following formula (D):



wherein n is about 5-15, preferably about 15,
 x is about 5-15, preferably about 15, and
 y is about 5-15, preferably about 15.

Still further useful nonionic block copolymer surfactants include ethoxylated
5 derivatives of propoxylated ethylene diamine, which may be represented by the
following formula:



where (EO) represents ethoxy,
10 (PO) represents propoxy,
 the amount of (PO)_x is such as to provide a molecular weight prior to
ethoxylation of about 300 to 7500, and the amount of (EO)_y is such as to provide
about 20% to 90% of the total weight of said compound.

15 Of these, the most preferred are those which are represented by formula (A)
 above; specific examples of which include those materials presently commercially
available under the tradename "Pluronic®", and in particular the Pluronic® F series,
Pluronic® L series, Pluronic® P series, as well as in the Pluronic® R series, each of
20 which are generally described to be block copolymers of propylene oxide and
ethylene oxide. Generally those of the Pluronic® L series and the Pluronic® R series
are preferred as these are supplied in liquid form by the manufacturer and are readily
formulated into the present inventive compositions. These are also available in a wide
range of HLB values, and those having HLB values in the range of 1.0 - 23.0 may be
used, although those with intermediate HLB values such as from about 12.0 - 18.0 are
25 found to be particularly advantageous. These materials are presently commercially
available from BASF AG (Ludwigshafen, Germany) as well as from BASF Corp.
(Mt. Olive Township, New Jersey).

Other useful exemplary nonionic block copolymers based on a polymeric
ethoxy/propoxy units which may also be used include those presently commercially
available in the Poly-Tergent® E, and Poly-Tergent® P series of materials from Olin

Chemicals Corp., (Stamford CT). These are described to be nonionic surfactants based on ethoxy/propoxy block copolymers, conveniently available in a liquid form from its supplier.

5 The inventive compositions further include at least one further nonionic surfactant which provides a further deterersive benefit to the inventive compositions. Preferred nonionic surfactants provide surprisingly good levels of cleaning performance, particularly in conjunction with the preferred quaternary ammonium compounds described herein.

10 A preferred class of nonionic surfactants are alkoxylated alcohols. These include the condensation products of a higher alcohol (e.g., an alkanol containing about 8 to 18 carbon atoms in a straight or branched chain configuration) condensed with about 2 to 30 moles of ethylene oxide, for example, lauryl or myristyl alcohol condensed with about 16 moles of ethylene oxide, tridecanol condensed with about 6 to moles of ethylene oxide, myristyl alcohol condensed with about 10 moles of 15 ethylene oxide per mole of myristyl alcohol, the condensation product of ethylene oxide with a distillation or separation fraction of coconut fatty alcohol containing a mixture of fatty alcohols with alkyl chains varying from 10 to about 14 carbon atoms in length and wherein the condensate contains either about 6 moles of ethylene oxide per mole of total alcohol or about 9 moles of ethylene oxide per mole of alcohol and 20 tallow alcohol ethoxylates containing 6 ethylene oxide to 11 ethylene oxide per mole of alcohol.

25 A preferred group of the foregoing nonionic surfactants are the Neodol® ethoxylates (Shell Chemical Co., Houston TX); which are higher aliphatic, primary alcohols containing about 9-15 carbon atoms, such as a C₁₁ alkanol condensed with 7 moles of ethylene oxide (Neodol® 1-7), C₉-C₁₁ alkanol condensed with an average of 2.5 moles of ethylene oxide (Neodol® 91-2.5); C₉-C₁₁ alkanol condensed with 6 moles of ethylene oxide (Neodol® 91-6), C₉-C₁₁ alkanol condensed with 8 moles of ethylene oxide (Neodol® 91-8), C₁₂₋₁₃ alkanol condensed with 6.5 moles ethylene oxide (Neodol® 23-6.5), C₁₂₋₁₃ alkanol condensed with 7 moles ethylene oxide 30 (Neodol® 23-7), C₁₂₋₁₅ alkanol condensed with 7 moles of ethylene oxide (Neodol®

25-7), C_{12-15} alkanol condensed with 9 moles ethylene oxide (Neodol® 25-9), C_{12-15} alkanol condensed with 12 moles ethylene oxide (Neodol® 25-12), C_{14-15} alkanol condensed with 13 moles ethylene oxide (Neodol® 45-13), and the like.

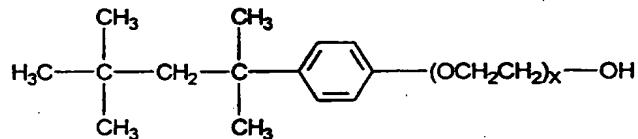
A further preferred group of nonionic surfactants which are advantageously present in the inventive compositions are those presently marketed under the Genapol® tradename. Particularly useful are those in the Genapol® "26-L" series which include for example: C12-16 linear alcohols condensed with 1 mole of ethylene oxide (Genapol® 24-L-3); C12-16 linear alcohols condensed with 1.6 moles of ethylene oxide (Genapol® 26-L-1.6); C12-16 linear alcohols condensed with 2 moles of ethylene oxide (Genapol® 26-L-2); C12-16 linear alcohols condensed with 3 moles of ethylene oxide (Genapol® 26-L-3); C12-16 linear alcohols condensed with 5 moles of ethylene oxide (Genapol® 26-L-5); as well as C12-16 linear alcohols condensed with varying amounts of ethylene oxide to provide specific cloud points of the surfactant (i.e., Genapol® 26-L-60, Genapol® 26-L-60N, and Genapol® 26-L-98N).
These materials are commercially available from a variety of sources, including Clariant Corp. (Charlotte, N.C.).

Additional useful nonionic surfactants include those based on alcohol and ethylene oxide condensates of a secondary aliphatic alcohol. These alcohols contain 8 to 18 carbon atoms in a straight or branched chain configuration and are condensed with 5 to 30 moles of an alkylene oxide, especially ethylene oxide. Examples of commercially available nonionic detergents of the foregoing type are $C_{11-C_{15}}$ secondary alkanols condensed with either 9 ethylene oxides (Tergitol® 15-S-9) or 7 ethylene oxides (Tergitol® 15-S-7) marketed by Union Carbide Corp. (Danbury CT). It is to be understood that these nonionic alkoxylated secondary alcohol surfactant compounds may be used singly or in mixtures of two or more such compounds.

Further useful nonionic surfactants include certain alkoxylated linear aliphatic alcohol surfactants which are believed to be the condensation products of a C_8-C_{10} hydrophilic moiety with alkylene oxides, especially polyethylene oxide and or polypropylene oxide moieties. Such alkoxylated linear alcohol surfactants are presently commercially available under the tradename PolyTergent® (Olin Chemical

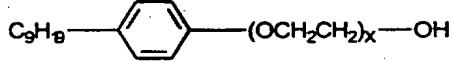
Co., Stamford CT). Of these particularly useful are those which are marketed as PolyTergent® SL-22, PolyTergent® SL-42, PolyTergent® SL-62 and PolyTergent® SL-29, of which PolyTergent® SL-62 is particularly advantageous. PolyTergent® SL-92 is described as being a moderately foaming, biodegradable alkoxyolated linear alcohol surfactant having on average 8 moles of oxyethylene groups per molecule. 5 These alkoxyolated linear alcohol surfactants provide good detergative action in the removal of many types of fats and greases such as are frequently found in soils on hard surfaces, as well as providing a further solubilizing effects and may be included in the concentrate compositions according to the present invention with advantage. 10 The preferred alkoxyolated linear alcohol surfactants also exhibit low levels of ocular irritation in the concentrate compositions.

15 Further useful nonionic surfactants include alkoxyolated, and particularly ethoxylated octyl and nonyl phenols according to the following general structural formulas:



15

or,



20

25

in which the C₉H₁₉ group in the latter formula is a mixture of branched chained isomers. In both formulae, x indicates an average number of ethoxy units in the side chain. Suitable non-ionic ethoxylated octyl and nonyl phenols include those having from about 7 to about 13 ethoxy units. Such compounds are commercially available under the trade name Triton® X (Union Carbide, Danbury CT).

Exemplary alkoxyolated alkyl phenols useful as a nonionic surfactant also

include certain compositions presently commercially available from the Rhône-

Poulenc Co., (Cranbury, NJ) under the general trade name Igepal®, which are described to be octyl and nonyl phenols. These specifically include Igepal® CO730

which is described as an ethoxylated nonyl phenol having an average of 15 ethoxy groups per molecule.

5 These nonionic surfactant compounds described above may be used singly or in mixtures. When present, these further nonionic surfactants comprise 0.01 - 10%wt. of the concentrate compositions, desirably comprise 0.1 - 8%wt. and most desirably comprise about 2 - 6%wt. and especially about 5%wt. of the concentrate compositions taught herein.

10 The inventive compositions optionally but desirably include a builder. Such a builder constituent may be present in an amount of from 0 - 3%wt. but preferably 0.1 - 0.5%wt. based on the total weight of the concentrate compositions taught herein. Such include water soluble inorganic builders which can be used alone, in admixture with other water soluble inorganic builders, as well as in conjunction with one or more organic alkaline sequestrant builder salts.

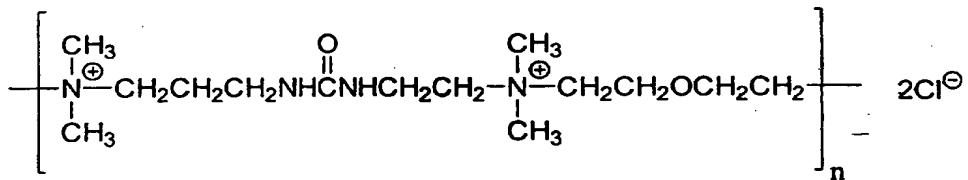
15 Exemplary builders include alkali metal carbonates, phosphates, polyphosphates and silicates. More specific examples include sodium tripolyphosphate, sodium carbonate, sodium bicarbonate, sodium tetraborate, potassium carbonate, sodium polyphosphate, potassium pyrophosphate, potassium tripolyphosphate, and sodium hexametaphosphate. Further exemplary builders also include organic alkaline sequestrant builder salts such as alkali metal polycarboxylates including water-soluble citrates such as sodium and potassium citrate, sodium and potassium tartarate, sodium and potassium ethylenediaminetetraacetate, sodium and potassium N-(2-hydroxyethyl)-ethylene diamine triacetates, sodium and potassium nitrilotriacetates, as well as sodium and potassium tartrate mono- and di-succinates. Also useful are gluconate or glucoheptonate salts particularly sodium gluconate and sodium glucoheptonate. Particularly advantageously used are di-, tri- and tetrasodium salts of ethylenediaminetetraacetic acid, especially tetrasodium salts thereof. As noted, these organic builder salts may be used individually, as a combination of two or more organic builder salts, as well as in conjunction with one or more detergency builders, including those indicated above. It is to be understood that many of these

builder materials also provide a useful pH stabilizing effect in the compositions in which they form a part.

As is noted above, the compositions according to the invention are aqueous in nature. Water is added to the constituents in order to provide 100% by weight of the composition. The water may be tap water, but is preferably distilled and is most preferably deionized water. If the water is tap water, it is preferably substantially free of any undesirable impurities such as organics or inorganics, especially mineral salts which are present in hard water which may thus interfere with the operation of one or more of the constituents of the aqueous compositions according to the invention.

10 Preferably the concentrate composition comprise at least 80% water.

An optional but in certain instances, particularly desirable further constituent is a cationic polymeric polyquaternary ammonium salt, especially a halogen salt such as a chloride salt. Such a material is one which includes at least one repeating monomer unit wherein such monomer includes as part of its structure a quaternary ammonium. A particularly useful class of such materials are those sold under the trade designation "Mirapol®" and are available from Rhône-Poulenc Surfactant & Specialty Chemicals Co. (Cranbury, NJ). These materials are highly cationic in nature, and are believed to be in accordance with the following general structure:



20 wherein n is an integer or 2 or greater, and is desirably in the range of 2 - 12, more desirably is about 6. Such a material is commercially available as Mirapol® A-15 from Rhône-Poulenc, identified above. When present, this material may comprise to 3%wt.

25 The inventors have found that the inclusion of such material provides a useful soil suspending benefit which is desirable from a cleaning standpoint, although it has also been observed by the inventors that inclusion of such a material may have a detrimental effect on the disinfecting properties of the compositions.

The constituents which may be used in the compositions according to the invention are known, many of which are described in *McCutcheon's Detergents and Emulsifiers*, North American Edition, 1991; *Kirk-Othmer, Encyclopedia of Chemical Technology*, 3rd Ed., Vol. 22, pp. 346-387, the contents of which are herein incorporated by reference.

5 The compositions according to the invention are useful in the disinfecting and/or cleaning of surfaces, especially hard surfaces in need of such treatment. These in particular include surfaces wherein the presence of gram positive and/or gram negative bacteria are suspected. In accordance with the present inventive process, 10 cleaning and/or disinfecting of such surfaces comprises the step of applying a stain releasing and a disinfecting effective amount of a composition as taught herein to such a stained surface. Afterwards, the compositions are optionally but desirably wiped, scrubbed or otherwise physically contacted with the hard surface, and further 15 optionally, may be subsequently rinsed from such a cleaned and disinfected hard surface.

Such a hard surface cleaning and disinfecting composition according to the invention is may be provided as a ready to use product which may be directly applied to a hard surface, but is desirably provided in a concentrated form intended to be diluted in water to form a cleaning composition therefrom.

20 By way of example, hard surfaces include surfaces composed of refractory materials such as: glazed and unglazed tile, porcelain, ceramics as well as stone including marble, granite, and other stones surfaces; glass; metals; plastics e.g. polyester, vinyl; fiberglass, Formica®, Corian® and other hard surfaces known to the industry. Hard surfaces which are to be particularly denoted are lavatory fixtures such 25 as shower stalls, bathtubs and bathing appliances (racks, shower doors, shower bars) toilets, bidets, wall and flooring surfaces especially those which include refractory materials and the like. Further hard surfaces which are to be denoted are those associated with kitchen environments and other environments associated with food preparation, including cabinets and countertop surfaces as well as walls and floor

surfaces especially those which include refractory materials, plastics, Formica®, Corian® and stone.

The hard surface cleaner composition provided according to the invention can be also be provided as a ready to use product in a manually operated spray dispensing container. Such a typical container is generally made of synthetic polymer plastic material such as polyethylene, polypropylene, polyvinyl chloride or the like and includes spray nozzle, a dip tube and associated pump dispensing parts and is thus ideally suited for use in a consumer "spray and wipe" application. In such an application, the consumer generally applies an effective amount of the cleaning composition using the pump and within a few moments thereafter, wipes off the treated area with a rag, towel, or sponge, usually a disposable paper towel or sponge. In certain applications, however, especially where undesirable stain deposits are heavy, the cleaning composition according to the invention may be left on the stained area until it has effectively loosened the stain deposits after which it may then be wiped off, rinsed off, or otherwise removed. For particularly heavy deposits of such undesired stains, multiple applications may also be used.

In a yet a further embodiment, the compositions according to the invention may be formulated so that it may be useful in conjunction with a "aerosol" type product wherein it is discharged from a pressurized aerosol container. If the inventive compositions are used in an aerosol type product, it is preferred that corrosion resistant aerosol containers such as coated or lined aerosol containers be used. Such are preferred as they are known to be resistant to the effects of basic formulations. Known art propellants such as liquid propellants as well as propellants of the non-liquid form, i.e., pressurized gases, including carbon dioxide, air, nitrogen, hydrocarbons as well as others may be used. Also, while satisfactory for use, fluorocarbons may be used as a propellant but for environmental and regulatory reasons their use is preferably avoided. In such an embodiment, the cleaning composition is dispensed by activating the release nozzle of said aerosol type container onto the stain and/or stain area, and in accordance with a manner as above-described a stain is treated and removed.

Whereas the present invention is intended to be used in the types of liquid forms described, the compositions according to the invention are desirably diluted with a further amount of water to form a cleaning and disinfecting solution therefrom. In such a proposed diluted cleaning solution, the greater the proportion of water added to form said cleaning dilution, the greater may be the reduction of the rate and/or efficacy of the thus formed cleaning solution in the cleaning of a hard surface, as well as a reduction in disinfectant efficacy. Accordingly, longer residence times upon the stain to effect their loosening and/or the usage of greater amounts may be necessitated. Conversely, nothing in the specification shall be also understood to limit the forming of a "super-concentrated" cleaning composition based upon the composition described above. Such a super-concentrated composition is essentially the same as the compositions described above except in that they include a lesser amount of water.

While the cleaning compositions are most beneficial for use in their form, i.e., their form as described above, they may also be diluted to form a cleaning composition therefrom. Such cleaning compositions may be easily prepared by diluting measured amounts of the compositions in further amounts of water by the consumer or other end user in certain weight ratios of composition: water, and optionally, agitating the same to ensure even distribution of the composition in the water. The concentrate compositions according to the invention may be used without further dilution, but may also be used with a further aqueous dilution, i.e., in concentrate composition: water concentrations of 1:0, to extremely dilute dilutions such as 1:1000. When subjected to further aqueous dilution, such a dilution is preferably a weight or volume ratio proportion of from 1:10 - 1:64, and most desirably is about 1:64. The actual dilution selected is in part determinable by the degree and amount of dirt and grime to be removed from a surface(s), the amount of mechanical force imparted to remove the same, as well as the observed efficacy of a particular dilution. Generally better results and faster removal is to be expected at lower relative dilutions of the composition and the water.

Other conventional optional additives, although not particularly elucidated herein may also be included in the present inventive compositions. Exemplary optional conventional additives include but are not limited to: pH adjusting agents and pH buffers including organic and inorganic salts; non-aqueous solvents, perfumes, perfume carriers, optical brighteners, coloring agents such as dyes and pigments, opacifying agents, hydrotropes, antifoaming agents, viscosity modifying agents such as thickeners, enzymes, anti-spotting agents, anti-oxidants, anti-corrosion agents as well as others not specifically elucidated here. These should be present in minor amounts, preferably in total comprise less than about 5% by weight of the compositions, and desirably less than about 3%wt.

The following examples below illustrate exemplary and preferred formulations of the concentrate composition according to the instant invention. It is to be understood that these examples are presented by means of illustration only and that further useful formulations fall within the scope of this invention and the claims may be readily produced by one skilled in the art and not deviate from the scope and spirit of the invention.

Throughout this specification and in the accompanying claims, weight percents of any constituent are to be understood as the weight percent of the active portion of the referenced constituent, unless otherwise indicated.

20

Example Formulations:

Preparation of Example Formulations:

Exemplary formulations illustrating certain preferred embodiments of the inventive compositions and described in more detail in Table 1 below were formulated generally in accordance with the following protocol.

25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
335
340
345
350
355
360
365
370
375
380
385
390
395
400
405
410
415
420
425
430
435
440
445
450
455
460
465
470
475
480
485
490
495
500
505
510
515
520
525
530
535
540
545
550
555
560
565
570
575
580
585
590
595
600
605
610
615
620
625
630
635
640
645
650
655
660
665
670
675
680
685
690
695
700
705
710
715
720
725
730
735
740
745
750
755
760
765
770
775
780
785
790
795
800
805
810
815
820
825
830
835
840
845
850
855
860
865
870
875
880
885
890
895
900
905
910
915
920
925
930
935
940
945
950
955
960
965
970
975
980
985
990
995
1000
1005
1010
1015
1020
1025
1030
1035
1040
1045
1050
1055
1060
1065
1070
1075
1080
1085
1090
1095
1100
1105
1110
1115
1120
1125
1130
1135
1140
1145
1150
1155
1160
1165
1170
1175
1180
1185
1190
1195
1200
1205
1210
1215
1220
1225
1230
1235
1240
1245
1250
1255
1260
1265
1270
1275
1280
1285
1290
1295
1300
1305
1310
1315
1320
1325
1330
1335
1340
1345
1350
1355
1360
1365
1370
1375
1380
1385
1390
1395
1400
1405
1410
1415
1420
1425
1430
1435
1440
1445
1450
1455
1460
1465
1470
1475
1480
1485
1490
1495
1500
1505
1510
1515
1520
1525
1530
1535
1540
1545
1550
1555
1560
1565
1570
1575
1580
1585
1590
1595
1600
1605
1610
1615
1620
1625
1630
1635
1640
1645
1650
1655
1660
1665
1670
1675
1680
1685
1690
1695
1700
1705
1710
1715
1720
1725
1730
1735
1740
1745
1750
1755
1760
1765
1770
1775
1780
1785
1790
1795
1800
1805
1810
1815
1820
1825
1830
1835
1840
1845
1850
1855
1860
1865
1870
1875
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
2105
2110
2115
2120
2125
2130
2135
2140
2145
2150
2155
2160
2165
2170
2175
2180
2185
2190
2195
2200
2205
2210
2215
2220
2225
2230
2235
2240
2245
2250
2255
2260
2265
2270
2275
2280
2285
2290
2295
2300
2305
2310
2315
2320
2325
2330
2335
2340
2345
2350
2355
2360
2365
2370
2375
2380
2385
2390
2395
2400
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
2460
2465
2470
2475
2480
2485
2490
2495
2500
2505
2510
2515
2520
2525
2530
2535
2540
2545
2550
2555
2560
2565
2570
2575
2580
2585
2590
2595
2600
2605
2610
2615
2620
2625
2630
2635
2640
2645
2650
2655
2660
2665
2670
2675
2680
2685
2690
2695
2700
2705
2710
2715
2720
2725
2730
2735
2740
2745
2750
2755
2760
2765
2770
2775
2780
2785
2790
2795
2800
2805
2810
2815
2820
2825
2830
2835
2840
2845
2850
2855
2860
2865
2870
2875
2880
2885
2890
2895
2900
2905
2910
2915
2920
2925
2930
2935
2940
2945
2950
2955
2960
2965
2970
2975
2980
2985
2990
2995
3000
3005
3010
3015
3020
3025
3030
3035
3040
3045
3050
3055
3060
3065
3070
3075
3080
3085
3090
3095
3100
3105
3110
3115
3120
3125
3130
3135
3140
3145
3150
3155
3160
3165
3170
3175
3180
3185
3190
3195
3200
3205
3210
3215
3220
3225
3230
3235
3240
3245
3250
3255
3260
3265
3270
3275
3280
3285
3290
3295
3300
3305
3310
3315
3320
3325
3330
3335
3340
3345
3350
3355
3360
3365
3370
3375
3380
3385
3390
3395
3400
3405
3410
3415
3420
3425
3430
3435
3440
3445
3450
3455
3460
3465
3470
3475
3480
3485
3490
3495
3500
3505
3510
3515
3520
3525
3530
3535
3540
3545
3550
3555
3560
3565
3570
3575
3580
3585
3590
3595
3600
3605
3610
3615
3620
3625
3630
3635
3640
3645
3650
3655
3660
3665
3670
3675
3680
3685
3690
3695
3700
3705
3710
3715
3720
3725
3730
3735
3740
3745
3750
3755
3760
3765
3770
3775
3780
3785
3790
3795
3800
3805
3810
3815
3820
3825
3830
3835
3840
3845
3850
3855
3860
3865
3870
3875
3880
3885
3890
3895
3900
3905
3910
3915
3920
3925
3930
3935
3940
3945
3950
3955
3960
3965
3970
3975
3980
3985
3990
3995
4000
4005
4010
4015
4020
4025
4030
4035
4040
4045
4050
4055
4060
4065
4070
4075
4080
4085
4090
4095
4100
4105
4110
4115
4120
4125
4130
4135
4140
4145
4150
4155
4160
4165
4170
4175
4180
4185
4190
4195
4200
4205
4210
4215
4220
4225
4230
4235
4240
4245
4250
4255
4260
4265
4270
4275
4280
4285
4290
4295
4300
4305
4310
4315
4320
4325
4330
4335
4340
4345
4350
4355
4360
4365
4370
4375
4380
4385
4390
4395
4400
4405
4410
4415
4420
4425
4430
4435
4440
4445
4450
4455
4460
4465
4470
4475
4480
4485
4490
4495
4500
4505
4510
4515
4520
4525
4530
4535
4540
4545
4550
4555
4560
4565
4570
4575
4580
4585
4590
4595
4600
4605
4610
4615
4620
4625
4630
4635
4640
4645
4650
4655
4660
4665
4670
4675
4680
4685
4690
4695
4700
4705
4710
4715
4720
4725
4730
4735
4740
4745
4750
4755
4760
4765
4770
4775
4780
4785
4790
4795
4800
4805
4810
4815
4820
4825
4830
4835
4840
4845
4850
4855
4860
4865
4870
4875
4880
4885
4890
4895
4900
4905
4910
4915
4920
4925
4930
4935
4940
4945
4950
4955
4960
4965
4970
4975
4980
4985
4990
4995
5000
5005
5010
5015
5020
5025
5030
5035
5040
5045
5050
5055
5060
5065
5070
5075
5080
5085
5090
5095
5100
5105
5110
5115
5120
5125
5130
5135
5140
5145
5150
5155
5160
5165
5170
5175
5180
5185
5190
5195
5200
5205
5210
5215
5220
5225
5230
5235
5240
5245
5250
5255
5260
5265
5270
5275
5280
5285
5290
5295
5300
5305
5310
5315
5320
5325
5330
5335
5340
5345
5350
5355
5360
5365
5370
5375
5380
5385
5390
5395
5400
5405
5410
5415
5420
5425
5430
5435
5440
5445
5450
5455
5460
5465
5470
5475
5480
5485
5490
5495
5500
5505
5510
5515
5520
5525
5530
5535
5540
5545
5550
5555
5560
5565
5570
5575
5580
5585
5590
5595
5600
5605
5610
5615
5620
5625
5630
5635
5640
5645
5650
5655
5660
5665
5670
5675
5680
5685
5690
5695
5700
5705
5710
5715
5720
5725
5730
5735
5740
5745
5750
5755
5760
5765
5770
5775
5780
5785
5790
5795
5800
5805
5810
5815
5820
5825
5830
5835
5840
5845
5850
5855
5860
5865
5870
5875
5880
5885
5890
5895
5900
5905
5910
5915
5920
5925
5930
5935
5940
5945
5950
5955
5960
5965
5970
5975
5980
5985
5990
5995
6000
6005
6010
6015
6020
6025
6030
6035
6040
6045
6050
6055
6060
6065
6070
6075
6080
6085
6090
6095
6100
6105
6110
6115
6120
6125
6130
6135
6140
6145
6150
6155
6160
6165
6170
6175
6180
6185
6190
6195
6200
6205
6210
6215
6220
6225
6230
6235
6240
6245
6250
6255
6260
6265
6270
6275
6280
6285
6290
6295
6300
6305
6310
6315
6320
6325
6330
6335
6340
6345
6350
6355
6360
6365
6370
6375
6380
6385
6390
6395
6400
6405
6410
6415
6420
6425
6430
6435
6440
6445
6450
6455
6460
6465
6470
6475
6480
6485
6490
6495
6500
6505
6510
6515
6520
6525
6530
6535
6540
6545
6550
6555
6560
6565
6570
6575
6580
6585
6590
6595
6600
6605
6610
6615
6620
6625
6630
6635
6640
6645
6650
6655
6660
6665
6670
6675
6680
6685
6690
6695
6700
6705
6710
6715
6720
6725
6730
6735
6740
6745
6750
6755
6760
6765
6770
6775
6780
6785
6790
6795
6800
6805
6810
6815
6820
6825
6830
6835
6840
6845
6850
6855
6860
6865
6870
6875
6880
6885
6890
6895
6900
6905
6910
6915
6920
6925
6930
6935
6940
6945
6950
6955
6960
6965
6970
6975
6980
6985
6990
6995
7000
7005
7010
7015
7020
7025
7030
7035
7040
7045
7050
7055
7060
7065
7070
7075
7080
7085
7090
7095
7100
7105
7110
7115
7120
7125
7130
7135
7140
7145
7150
7155
7160
7165
7170
7175
7180
7185
7190
7195
7200
7205
7210
7215
7220
7225
7230
7235
7240
7245
7250
7255
7260
7265
7270
7275
7280
7285
7290
7295
7300
7305
7310
7315
7320
7325
7330
7335
7340
7345
7350
7355
7360
7365
7370
7375
7380
7385
7390
7395
7400
7405
7410
7415
7420
7425
7430
7435
7440
7445
7450
7455
7460
7465
7470
7475
7480
7485
7490
7495
7500
7505
7510
7515
7520
7525
7530
7535
7540
7545
7550
7555
7560
7565
7570
7575
7580
7585
7590
7595
7600
7605
7610
7615
7620
7625
7630
7635
7640
7645
7650
7655
7660
7665
7670
7675
7680
7685
7690
7695
7700
7705
7710
7715
7720
7725
7730
7735
7740
7745
7750
7755
7760
7765
7770
7775
7780
7785
7790
7795
7800
7805
7810
7815
7820
7825
7830
7835
7840
7845
7850
7855
7860
7865
7870
7875
7880
7885
7890
7895
7900
7905
7910
7915
7920
7925
7930
7935
7940
7945
7950
7955
7960
7965
7970
7975
7980
7985
7990
7995
8000
8005
8010
8015
8020
8025
8030
8035
8040
8045
8050
8055
8060
8065
8070
8075
8080
8085
8090
8095
8100
8105
8110
8115
8120
8125
8130
8135
8140
8145
8150
8155
8160
8165
8170
8175
8180
8185
8190
8195
8200
8205
8210
8215
8220
8225
8230
8235
8240
8245
8250
8255
8260
8265
8270
8275
8280
8285
8290
8295
8300
8305
8310
8315
8320
8325
8330
8335
8340
8345
8350
8355
8360
8365
8370
8375
8380
8385
8390
8395
8400
8405
8410
8415
8420
8425
8430
8435
8440
8445
8450
8455
8460
8465
8470
8475
8480
8485
8490
8495
8500
8505
8510
8515
8520
8525
8530
8535
8540
8545
8550
8555
8560
8565
8570
8575
8580
8585
8590
8595
8600
8605
8610
8615
8620
8625
8630
8635
8640
8645
8650
8655
8660
8665
8670
8675
8680
8685
8690
8695
8700
8705
8710
8715
8720
8725
8730
8735
8740
8745
8750
8755
8760
8765
8770
8775
8780
8785
8790
8795
8800
8805
8810
8815
8820
8825
8830
8835
8840
8845
8850
8855
8860
8865
8870
8875
8880
8885
8890
8895
8900
8905
8910
8915
8920
8925
8930
8935
8940
8945
8950
8955
8960
8965
8970
8975
8980
8985
8990
8995
9000
9005
9010
9015
9020
9025
9030
9035
9040
9045
9050
9055
9060
9065
9070
9075
9080
9085
9090
9095
9100
9105
9110
9115
9120
9125
9130
9135
9140
9145
9150
9155
9160
9165
9170
9175
9180
9185
9190
9195
9200
9205
92

were first preheated to render them pourable liquids prior to addition and mixing. Mixing of the constituents was achieved by the use of a mechanical stirrer with a small diameter propeller at the end of its rotating shaft. Mixing, which generally lasted from 5 minutes to 120 minutes was maintained until the particular exemplary formulation appeared to be homogeneous. The exemplary compositions were readily pourable, and retained well mixed characteristics (i.e., stable mixtures) upon standing for extend periods. The compositions of the example formulations are listed on Table 1. The weight percentages indicated the "as supplied" weights of the named constituent.

As is indicated, to all of the formulations of Table 1 was added sufficient deionized water in "quantum sufficient" to provide 100 parts by weight of a particular formulation.

Table 1	Control	542-050D
	Comp.1	Ex.1
Neodol® 25-7	5.00	—
PolyTergent® SL-62	—	4.00
BTC® 8358 (80%)	1.625	1.625
Pluronic L64	2.0	—
Glucopon® 325N (50%)	—	4.0
EDTA (38%)	0.25	0.25
Fragrance	0.20	0.20
Dye Solution	0.20	0.20
DI water	q.s.	q.s.

5 The identity of the constituents of Table 1 above are described in more detail on Table 2, below, including the "actives" percentage of each were a constituent was not 100%wt. "actives".

TABLE 2	
<u>constituent:</u>	<u>identity:</u>
Pluronic® L-64	nonionic ethoxy/propoxy block copolymer surfactant (BASF Corp.)
Neodol® 25-7	nonionic C12-15 alkanol condensed with 7 moles ethylene oxide (Shell Chemical Co.)
Polytergent® SL-62	alkoxylated alcohol (BASF Inc.)
Glucopon® 325N (50%)	technical grade mixture of C9-11 alkylpolyglycosides (Henkel Corp.)
BTC® 8358 (80%)	alkyl dimethyl benzyl ammonium chloride (Stepan Co.)
EDTA (38%)	tetrasodium ethylenediaminetetraacetate
Fragrance	proprietary composition
dye solution	proprietary composition
DI water	deionized water

Evaluation of Antimicrobial Efficacy:

10 Several of the exemplary formulations described in more detail on Table 1 above were evaluated in order to evaluate their antimicrobial efficacy against

5 *Staphylococcus aureus* (gram positive type pathogenic bacteria) (ATCC 6538), and
6 *Salmonella choleraesuis* (gram negative type pathogenic bacteria) (ATCC 10708)
7 The testing was performed in accordance with the protocols outlined in "Use-Dilution
8 Method", Protocols 955.14, 955.15 and 964.02 described in Chapter 6 of "Official
9 Methods of Analysis", 16th Edition, of the Association of Official Analytical
10 Chemists; "Germicidal and Detergent Sanitizing Action of Disinfectants", 960.09
11 described in Chapter 6 of "Official Methods of Analysis", 15th Edition, of the
12 Association of Official Analytical Chemists; or American Society for Testing and
13 Materials (ASTM) E 1054-91 the contents of which are herein incorporated by
14 reference. This test is also commonly referred to as the "AOAC Use-Dilution Test
15 Method".

16 As is appreciated by the skilled practitioner in the art, the results of the AOAC
17 Use-Dilution Test Method indicates the number of test substrates wherein the tested
18 organism remains viable after contact for 10 minutes with a test disinfecting
19 composition / total number of tested substrates (cylinders) evaluated in accordance
20 with the AOAC Use-Dilution Test. Thus, a result of "0/60" indicates that of 60 test
21 substrates bearing the test organism and contacted for 10 minutes in a test disinfecting
22 composition, 0 test substrates had viable (live) test organisms at the conclusion of the
23 test. Such a result is excellent, illustrating the excellent disinfecting efficacy of the
24 tested composition. Results for lesser amount of test substrates such as for 10, 20, 30
25 or 40 test substrates provide useful screening results, although insufficient to satisfy
the requirement of 60 test substrates as dictated by the AOAC Use-Dilution Test.

26 Results of the antimicrobial testing are indicated on Table 3, below. The
27 reported results indicate the number of test cylinders with live test organisms/number
28 of test cylinders tested for each example formulation and organism tested.

Table 3

Formulation:	<i>Staphylococcus aureus</i>	<i>Salmonella choleraesuis</i>
Comp.1	0/30	0/30
Ex.1	0/60	1/60

Evaluation of Ocular Irritation:

The ocular irritation characteristics of formulations according to the invention were evaluated using the known Draize Eye test protocol. Evaluation was performed on several formulations according to the invention and described more fully in Table 5 above.

As known to those skilled in the art, the Draize Eye Test measures eye irritation for the grading of severity of ocular lesions, measuring three dimensions: scores obtained for the cornea, iris and conjunctiva. For the cornea, after exposure to the composition, A the cornea opacity is graded on a scale from 1 to 4; B the area of cornea involved is graded on a scale from 1-4 (where the score = $A \times B \times 5$ may be a total maximum of 80). For evaluation of the iris, after exposure the composition, A the involvement of the iris is graded on a scale of 1-2 (where the score = $A \times 5$ may be a total maximum of 10). For a evaluation of the conjunctive, A Redness is graded on a scale of 1-3; B Chemosis is graded on a scale of 1-4; and C Discharge is measured on a scale of 1-3 [where the score = $(A + B + C) \times 2$ may be a maximum of 20]. The maximum total score is the sum of all scores obtained for the cornea, iris and conjunctive (a maximum of 110).

The results of the Draize test are reported below. These indicate that an EPA classification Category "3" was appropriate, where corneal involvement or irritation cleared in "21" days or less. These results are in accordance with the guidelines of the Environmental Protection Agency (EPA), 40 C.F.R. Ch.1, §162.10, (1986).

TABLE 4	
Formulation:	Corneal opacity in test subjects / number of days
Control 1	8.33 / 21
Ex.1	0 / 21

As may be seen from these results, the composition according to Ex. 1 exhibited very low levels of ocular irritation, as is demonstrated by the rapid rate at which corneal opacity cleared in the test subjects.

Evaluation of Cleaning Efficacy:

5 Various formulations amongst those listed above were evaluated for their cleaning efficacy on tile surfaces utilizing the following protocols. "Standard soiled tiles" were prepared for use in the tests. These were prepared in accordance with the protocol described in ASTM 4488-87, Annex A5 "Particulate and Oily Soil/Vinyl Tiles Test Method". This preparation of standard soiled tiles and cleaning protocol was performed for certain of cleaning compositions formed from the formulations described in more detail on Table 1.

10 Evaluation was performed utilizing a Gardner Washability Apparatus, using a standard soil tiles prepared in accordance with the protocol described above at a standard pressure and sponge stroke settings in order to determine or quantify the cleaning efficiency of the formulations. These formulations were used formed into a cleaning composition wherein 1 part of a formulation of Table 1 was diluted with 64 parts water. For comparative purposes, a 1:64 dilution of a commercially available 15 concentrated cleaning and disinfecting preparation, Lysol® Deodorizing Cleaner "Country Scent" variety was also prepared and evaluated in the same test. In determining the cleaning efficiency of each of the formulations, reflectance values were determined using a Minolta Chromameter where each tile was measured three times and the mean reflectance value are reported below on Table 5. For each of these 20 tiles, there were at least four replicates, each of which were evaluated and used to determine the mean reflectance value of Table 5. Testing was performed for each of the following: a clean unsoiled tile, a soiled tile, and a soiled tile following Gardner Washability Apparatus scrubbing. Such reflectance values were then employed to calculate cleaning efficiency according to the following formula:

25
$$\text{Cleaning Efficiency} = \frac{Lt - Ls}{Lo - Ls}$$

wherein:

Lt = reflectance average after scrubbing solid tile;

Ls = reflectance average before cleaning soiled tile;

30 Lo = reflectance average original tile before soiling.

The evaluation procedure noted above was performed in groups of test tiles, wherein the cleaning compositions formed from formulations according to Table 1 were compared to a tiles treated with the cleaning composition formed using a commercially available product, Lysol® Deodorizing Cleaner "Country Scent" formulation (Reckitt & Colman Inc., Montvale NJ). These cleaning efficiency results are shown in the Table 5, following.

5 **Table 5**

Formulation:	Oily
Lysol® Deodorizing Cleaner "Country Scent" formulation	45 - 50%
Comp.1	35 - 40%
Ex.1	50 - 55%

10 As shown, the measurement of the cleaning effectiveness of the test samples involved the ability of the cleaning composition to remove the test soil from the test substrate. This was expressed by Cleaning Efficiency; as numerical values for a Cleaning Efficiency increase, higher cleaning effectiveness is achieved for the cleaning composition tested. As the results show, the inventive composition showed excellent cleaning characteristics which favorably compare to the commercially 15 available products.

Claims:

5 1. Aqueous disinfecting and cleaning composition which exhibits reduced irritancy
which comprises,
a disinfecting effective amount of a quaternary ammonium compound having
germicidal properties;
a mitigating effective amount of at least one nonionic surfactant selected from
10 alkylpolyglycoside compounds;
0.1 - 10%wt. of a nonionic surfactant;
0 - 3%wt. of a polymeric cationic surfactant based on a polyquaternary
ammonium salt;
0 - 3%wt. of a builder 0 - 5%wt. of one or more conventional additives
15 particularly coloring agents, fragrances and fragrance solubilizers, viscosity
modifying agents such as thickeners, pH adjusting agents and pH buffers
including organic and inorganic salts; and, water to form 100%wt.

20 2. The concentrate composition according to claim 1 wherein the quaternary
ammonium compound having germicidal properties is present in an amount of
from about 0.001 - 5% wt.

25 3. The concentrate composition according to claim 1 wherein the at least one
further nonionic surfactant is present in an amount of from about 0.1 -
8%wt.

30 4. The concentrate composition according to claim 3 wherein the at least one
further nonionic surfactant is an alkoxylated primary alcohol.

5. The concentrate composition according to claim 3 wherein the at least one further nonionic surfactant is a polymeric alkylene oxide block copolymer.
6. An aqueous composition which comprises 1 part of the aqueous disinfecting and cleaning concentrate composition per 10 to 64 parts water.
7. Aqueous disinfecting and cleaning composition in a concentrated form which exhibits reduced irritancy which comprises:
 - 10 a disinfecting effective amount of a quaternary ammonium compound having germicidal properties;
 - a mitigating effective amount of a binary surfactant system which comprises both (a) at least one nonionic surfactant selected from alkylpolyglycoside compounds, with (b) at least one further nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer;
 - 15 0.1 - 10%wt. of at least one further nonionic surfactant;
 - 0 - 3%wt. of a polymeric cationic surfactant based on a polyquaternary ammonium salt;
 - 0 - 3%wt. of a builder;
 - 0 - 5%wt. of one or more conventional additives particularly coloring agents, 20 fragrances and fragrance solubilizers, viscosity modifying agents such as thickeners, pH adjusting agents and pH buffers including organic and inorganic salts; and,
 - water to form 100%wt. of the concentrate form of the inventive compositions.
8. The concentrate composition according to claim 7 wherein the quaternary ammonium compound having germicidal properties is present in an amount of from about 0.001 - 5% wt.
9. The concentrate composition according to claim 7 wherein the binary surfactant system is present in an amount of from 0.1 - 10%wt.

10. The concentrate composition according to claim 7 which comprises at least one further nonionic surfactant.

5 11. The concentrate composition according to claim 10 wherein the at least one further nonionic surfactant is an alkoxylated primary alcohol.

10 10. An aqueous composition which comprises 1 part of the aqueous disinfecting and cleaning concentrate composition according to claim 7 per 10 to 64 parts water.

15 11. A process for cleaning and/or disinfecting of hard surfaces which comprises the step of:
applying an effective amount of a composition according to claim 1 to the surface.

20 12. A process for cleaning and/or disinfecting of hard surfaces which comprises the step of:
applying an effective amount of a composition according to claim 7 to the surface.

13. A concentrate composition according to claim 1 substantially as described with reference to one or more of the Examples.



The
Patent
Office

38

Application No: GB 9807664.9
Claims searched: 1 to 13

Examiner: Michael Conlon
Date of search: 16 July 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including **GB, EP, WO & US** patent specifications, in:

UK CI (Ed.P): C5D (DHX, DHZ, DJX, D162)

Int Cl (Ed.6): C11D 3/00

Other: Online: WPI, CLAIMS

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB2309706 A (Reckitt & Colman) Examples 1, 4 and 5	1 at least
X	WO95/31962 A1 (Gojo) Table XIV on page 38	1 at least
X	US4755327 (Bernaducci) Table I and column 6 line 13	1 at least

<input checked="" type="checkbox"/> Document indicating lack of novelty or inventive step	<input checked="" type="checkbox"/> Document indicating technological background and/or state of the art.
<input checked="" type="checkbox"/> Document indicating lack of inventive step if combined with one or more other documents of same category.	<input checked="" type="checkbox"/> Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	<input checked="" type="checkbox"/> Patent document published on or after, but with priority date earlier than, the filing date of this application.